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(57) Abstract: A system includes a virtual trading floor and a plurality of exchange points, each connectable to each other exchange point by remote switching equipment associated with each respective exchange point, wherein each exchange point is connectable to the virtual trading floor via the Internet to trade connection capacity between the exchange points. The virtual trading floor can match buy and sell orders from respective ones of the plurality of exchange points; and provision a connection between respective ones of the plurality of exchange points after a match has been made. Each exchange point further comprises an intelligent agent module constructed and adapted to automatically trade connection capacity on behalf of that user's pre-programmed parameters by site, wherein the agent module can buy new capacity when current capacity is close to being exceeded; sell existing capacity when the existing capacity is not needed; and buy new capacity if such a trade would provide capacity of a lower cost than current capacity; buy capacity for a user programmed marketing event; buy capacity for disaster recovery, meaning the user has a loss of another supplier for capacity and requires a short term contract to fulfill current capacity requirements; and to buy and sell capacity on a pre-programmed basis for time-of-day, week or month.

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## **VIRTUAL TRADING FLOOR AND INTELLIGENT AGENTS FOR TELECOMMUNICATIONS PRODUCTS AND SERVICES**

### **RELATED APPLICATIONS**

This application is related to and claims priority under 35 U.S.C. 120 from co-  
5 pending provisional United States Patent application No. 60/166,170, titled "Virtual  
Real Time Exchange", filed November 18, 1999, the contents of which are  
incorporated herein by reference.

### **1. FIELD OF THE INVENTION**

This invention relates to trading and provisioning of telecommunications'  
10 products and/or services. More specifically, this invention relates to methods,  
systems and devices for providing a virtual trading floor for telecommunications'  
products and/or services (including, without limitation, minutes, bandwidth, dark  
fiber, ducts, IPT [Internet Protocol Telephony] collocation products and other  
measures of capacity).

### **15 2. BACKGROUND AND SUMMARY**

The exemplary embodiments of the invention provide a full service exchange  
provisioned, e.g., via the Internet, for telecommunications companies to lease, buy  
and sell capacity and other telecommunications products and/or services (e.g.,  
switched minutes, bandwidth, dark fiber, ducts, IPT and collocation products).

20 Some exemplary embodiments of invention create and provide a virtual  
market exchange for the activation of bandwidth through a system of nodes connected  
by either leased or owned data transport facilities. The scope of this exchange may  
include a trading floor operation (through which trading-members execute network  
capacity trade orders) and a trade provisioning operation (that manages the workflow

for network provisioning on a per trade basis). The scope of this exchange may also include network management elements, which provision and maintain a communication network associated with the trading floor operation, and call processing operations, which dynamically manage call routing within that communication network and others. The exchange may also include account management elements, which oversee and authorize the viability of member accounts and billing and settlement operations.

In some exemplary embodiments, this invention provides a web-based user interface for trading and messaging activity. Exemplary embodiment also may provide real-time back-end operational interfaces to network control, management and accounting systems.

In some exemplary embodiments, trading may be performed and in conjunction with the operation of an Intelligent Agent (IA), where the IA is a user programmable module that a trading-member may pre-program based on time-of-day, marketing events, disaster recovery conditions, and other trading-member communication network conditions for buy/sell orders to be posted on a virtual real time exchange trading floor. The IA may interface through an Application Protocol Interface (API) into a trading-member's Least-Cost Routing (LCR) system that continually monitors the LCR outputs from the trading floor and notifies the trading-member's IA of possible buy/sell conditions to the trading floor operation. The IA may be constructed and adapted to (a) buy new capacity when current capacity is close to being exceeded; (b) sell existing capacity when the existing capacity is not needed; and/or (c) buy new capacity if such a trade would provide capacity of a lower cost than current capacity.

In some exemplary embodiments, any portion or all of the processes and modules necessary to post and execute a trade may be automated as the IA initiates a trade order posting process and "negotiate the trade" function, thus realizing a hands-off multi-lateral interconnect networking environment.

- 5           In one aspect of the invention, a system is provided that includes a virtual trading floor and a plurality of exchange points, each exchange point being connectable to each other exchange point by remote switching equipment associated with each respective exchange point that directly accesses a communication network owned and/or operated by the owners and/or operators of the virtual trading floor.
- 10       Such a communication network may be, for example, a global, core, mesh network (e.g., utilizing asynchronous transfer mode technology). In such an implementation, each trading-member is connectable with the virtual trading floor to trade connection capacity between exchange points owned and/or operated by the trading-member.

- In some exemplary embodiments, the one or more of the trading-members
- 15       connect to the virtual trading floor via a publicly accessible communication/data network such as the Internet.

- In some exemplary embodiments of this invention, the virtual trading floor system may be constructed and adapted to match trade orders, e.g., buy and sell orders, from trading-members and to provision a connection between exchange points
- 20       associated with those trading-members after a match has been made.

- In another aspect, this invention provides a virtual trading floor in a telecommunications system in which a plurality of exchange points are each connectable to each other exchange point by remote switching equipment associated with each respective exchange point that directly accesses a virtual real-time
- 25       exchange global, core, mesh network, wherein trading-members associated with each

exchange point can access the virtual trading floor to trade connection capacity between the exchange points. In some exemplary embodiments of the invention, one or more of the trading-members may connect to the virtual trading floor via a publicly accessible communication/data network such as the Internet.

5           Some exemplary embodiments of the present invention attempt to achieve various objectives, including but not limited to providing anonymity to all trading-members, reducing provisioning time from what today is a ninety day cycle to three minutes, and providing clearinghouse capabilities that reduce financial settlements from a one hundred and eighty day cycle to three days.

## 10                           BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects and advantages of the invention will be apparent upon consideration of the following detailed description, taken in conjunction with the accompanying drawings, in which the reference characters refer to like parts throughout and in which:

15           **FIGURE 1** depicts an overview of the system according to exemplary embodiments of the present invention;

**FIGURE 2** depicts the virtual real-time trading system architecture incorporated in the VTF system illustrated in **FIGURE 1**, in more detail;

20           **FIGURE 3** is a flowchart depicting an order posting operations according to an exemplary embodiment of this invention;

**FIGURE 4** is a flowchart depicting an order of matching operations according to an exemplary embodiment of the present invention; and

**FIGURE 5** is a flowchart depicting transaction execution according to an exemplary embodiment of this invention.

## DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

Prior to discussing the exemplary embodiments of the invention, an explanation of various terminology used throughout this application is provided for the better understanding of the reader.

5 It should be appreciated that trading on the virtual trading floor (VTF) system explained herein may be an activity which requires the paying of various fees from trading-members to the owners and/or operators of the VTF and associated hardware and software modules illustrated in the figures.

Trading-members may be, for example, a telecommunication carrier that have  
10 registered with trading floor and is approved by the trading floor as a potential seller and/or buyer of telecommunications products. A trading-member may be active for trading once some portion of its communication network, e.g., their trunk groups, have been configured to be tradable on the trading floor. A trunk is the smallest unit of a trading-member's network. A trunk may be physically interconnected into the  
15 trading floor network at a defined termination location.

Fees associated with trade on the VTF system, may be set based on a fee structure, which may be the set of fees that a trading-member is obligated for under the terms of the master agreement executed as part of an entity becoming a trading-member recognized by the VTF system. The master agreement may define the  
20 contractual terms between the owners and/or operators of the VTF system and one or more trading-members. It may also define the financial obligations of one or more trading-members.

The fee structure may include, for example, connection fees, recurring port fees, transaction fees and/or reservation fees. A connection fee may be set based on  
25 the cost per provisioned communications port. As a result, the connection fee may be

a onetime charge assessed and posted at the completion of provisioning a device located at the edge of the VTF system's communication network, e.g., an exchange point. The recurring port fee may be a monthly rate per provisioned communication port. The transaction fee may be a commission charged by the VTF system, assessed to the trading-members who have successfully negotiated a confirmed trade. Based on the traded volume, e.g., the product of the traded trunk-group-minutes and the traded for rate. The fee structure may also include a reservation fee, which may be a fee assessed when a confirmed trade occurs. The reservation fee may be based on a calculation of the product of the rate, or cost per unit, and the number of units, e.g., trunk-group-minutes.

It should be appreciated that products and/or services that may be traded between trading-members via the VTF system may include, but are not limited to, minutes, IP bandwidth, dark fiber, ducts, IPT, collocation products and other measures of capacity etc.

Once a trade (or transaction) has been posted on the VTF, the proposed trade may be assigned a cypher code, e.g., {city code, port id, trunk id, customer code}. It is foreseeable that the cypher code may allow, e.g., for 20-50 characters. The 'city code' may identify the termination location. The 'port id' may be a trading floor network port. The 'trunk id' may be a unique identifier of the trading-member's trunk. It is foreseeable that, if it is in a T1 (a T1 = 1.5 M and contains twenty-four trunks, whereas a T3 contains twenty-eight T1s) group, the last two digits may be an occurrence from 01-24. Similarly, if it is in an E1 (E1 = 2.048 M and contains thirty trunks, whereas an E3 contains sixteen E1s) group the last two digits will be an occurrence from 01-30. The 'customer code' may be assigned within the trading floor and uniquely identifies a trading-member.

It should be appreciated that capacity on trunks within the same termination location can be grouped for the purpose of creating a trade order suite. Capacity on a single trunk can also be offered on a trade order. The telecommunications industry standard is 10,000 trunk-group-minutes/month, whereas the VTF system standard may be 14,400 trunk-group-minutes per month.

The termination location may be a termination node on the VTF communication network owned and/or operated by the VTF system owners and/or operators. This termination node is the location at which physical interconnection between the VTF communication network and the trading-members' communication networks are made. The termination location may be identified by a 'city code' that may contain a city name. It is foreseeable that a list of potential termination locations may be kept within memory within the VTF system.

A trade order may be, for example, a statement of the trading-member's product and/or service that is to be purchased or sold on the VTF. A trade order may include data indicating the type of trade, e.g., buy or sell, identification of the telecommunication product or service to buy or sell, identification of the trading-member posting the order, any political restriction (which may be non-public; that is, not provided to other trading-members), e.g., identification of those carriers with which the trading-member is unwilling to do business, location of the termination point of the service or product, identification of the involved trunk(s) (non-public), the rate and quantity of the product or service, the transaction interval, the start date for the transaction, the Answer Seizure Ratio (ASR) (which may be required, measured, predicted or desired), the QoS for the product or service, information relating to any type of service level agreement, and the life of the order (e.g., defining the duration



that a trade order is in effect on the VTF, which is, until the parameters are met or a transaction has transpired).

It should be understood that information related to the trading-member and location may be derived. It also should be understood that information about any political restrictions may be optional. It is foreseeable that it may be required that a trade order include data indicating the type of trade, the type of telecommunication product or service, identification of the involved trunks, location or the trunks, rate, quantity, indication of the transaction interval, the start date for the transaction, the ASR and the QoS for the service.

A trade, or transaction, is an interconnect agreement between trading-members to buy and sell a specified quantity of telecommunication products and or services at an agreed rate for a defined duration to a specified termination location. A trade may include various elements that may be collected from the corresponding matching buy and sell trade orders. Thus, a trade (transaction) may include data indicating the involved trunk group(s), a settlement rate, a quantity of product or service, the transaction interval, e.g., a minimum of one week (i.e., 7 days) and a maximum of four weeks, day-of-week limitations and time-of-day locations, and the termination location.

A trade agreement, or transaction agreement, is a contractually binding agreement executed between the buy/sell trading-members for a specific trade or transaction.

Figure 1 depicts an overview of a VTF system 100 according to an exemplary embodiment of the present invention. As shown in Figure 1, a system 100 according to at least one of the embodiments of the present invention comprises a number of exchange points 102-A, 102-B, ... at various geographic locations, for example,

geographic locations around the world. Each of the exchange points 102 includes one or more local access concentrators 104-1, 104-2, ... (access concentrator 104) that connect the exchange points to a trading-member (IXC, CLEC, ILEC) 106. In addition, the exchange points 102-A, 102-B,... include a gateway ATM switching equipment 110 and regional ATM switching equipment 111 that may be collocated with the access concentrators 104. Collocation is preferable, for example, to allow an exchange point 102 to connect to other exchange points 102.

The access concentrators 104-1,104-2 may be edge devices, e.g., a switch, or any other device that may act as a point of interface with the trading-member 106.

The entire configuration of an exchange point 102 (including the access concentrators 104 and the ATM switching equipment 110 and 111) may be controlled by modules in the VTF system 100, e.g., the trade provisioning module 126 described below, which may control and/or administer for that particular exchange point. The ATM equipment 110 or 111 may be, for example, a GX550 or CBX500 provided by Lucent®.

Local switching equipment 108 provides data communication capability (delivery of content including, for example, voice, video, data, etc.), between a communication network owned and/or operated by the trading-member 106 and the communication network owned and/or operated by the VTF system 100. The local switching equipment 108 includes the point of interface that couples the trading-member 106 to the access concentrator 104. The local switching equipment 108 may be, for example, a PSAX 2300, provided by Lucent®. The local switching equipment 108 may provide relatively large bandwidth capabilities, e.g., DS1 or DS3, E1, etc.

The softswitch 112 may be, for example, a device such as a platform for controlling data (for example, voice) transmission using software and generic

computing platforms. The softswitch may control the switching ATM, frame relay, Internet Protocol (IP), and/or Time-Division-Multiplexing traffic, as well as provide a platform for the delivery of call features and service applications.

The combined architecture of the access concentrator 104, ATM switching  
5 equipment 110, 111 and softswitch 112 are included within the VTF communication network. The VTF communication network may also include the local switching equipment 108.

At any given time, any or all of the connections involving a particular  
exchange points 102 are governed by a switching table 112 associated with the  
10 respective access concentrator 104-1, 104-2,... corresponding to the exchange point 102-A, 102-B,... The switching table 112 for an exchange point 102-A includes one or more entries for all other exchange points to which the exchange point 102-A is connectable. For example, an exchange point 102-B located in London, UK might have connection/switching table entries for connection with exchange points 102 in  
15 New York, Amsterdam, Los Angeles, Frankfurt, Miami, etc.

The switching table entries also may include information relating to pricing, quality of service (QoS), type of connection (fiber, wire, etc.) and the like.

To establish a connection (e.g., for telephone calls or other data transmission) from a trading-member 106 connected (or connectable) to the access concentrator 104  
20 at one exchange point 102-A to another trading-member connected (or connectable) to an access concentrator 104 at another exchange point 102-B, the appropriate entries must exist in the switching tables 112 associated with the respective access concentrator 104 at exchange points 102-A and 102-B. In other words, in order for the ATM switching equipment 110 at the exchange point 102-A to be able to establish

a connection to the ATM switching equipment 110 at another exchange point 102-B, the switching tables 112 at each of the sites must contain requisite information.

Within the VTF system 100, a VTF 118 (Figures 1 and 2) is accessible to users of the system 100 using, for example, web browsers connected to the public network 116, or any other conventionally known and advantageously implemented data/communication scheme. The VTF system 100 provides, as described below, a mechanism for trading-members 106 to trade various communication capacity-related products and/or services so as to establish appropriate, necessary or desired connections between exchange points.

A trading-member 106 is a telecommunications carrier who has been approved by the owners and/or operators of the VTF 118 to conduct trades on the VTF 118. As described herein, a trading-member's data communication network is physically connected or connectable to the VTF system's data communication network. Prior to a trading-member initiating trades on the trading floor, a trading account is established, which maintains appropriate funds to cover trading activity on the trading floor. The balance threshold required for the trading account may be derived by a predefined function.

As shown in Figures 1 and 2, the VTF 118 works in conjunction with an account management module 124, a network management module 114, a call processing module 112, a trade provisioning module 126, a member support module 128 and a membership management module 130.

The account management module 124 is coupled to the VTF information repository 120 and acts as a gatekeeper for all trading-member account activity. The account management module 124 may utilize the *Oracle Financials* accounting package. The account management module 124 provides all billing functionality for

contractual fees and settlements. The account management module 124 also maintains call detail records (CDR) to support the trade or transaction settlement process based on the trade agreement.

During trading on the VTF 118, the account management module 124 verifies  
5 account information corresponding to buy/sell orders by verifying the trading-member accounts for, for example, fund availability, credit standing, etc., to insure a trading-member 106 can cover the costs and trade fees that will be assessed following execution of the transaction. As illustrated in FIGURE 2, the account management module 124 may also be coupled to one or more financial institutions to, e.g., make  
10 financial transactions with accounts of trading-members and/or obtain billing, credit and other associated account information. Additionally, the account management module 124 also generates a bill record for all trades by, e.g., assessing the reservation fee for transactions following transaction execution.

The network management module 114 is coupled to the VTF information  
15 depository 114 and may utilize a *Naviscore Network Management System*. The network management module 114 performs network provisioning and management activities. The network management module 114 estimates service provisioning completion dates by providing status of the estimated and actual completion dates of the service provisioning. The network management module 114 also updates trading-  
20 members' accounts with network elements by providing a network element inventory, e.g., trunk group identification data, ports, capacity data, location data, etc., upon completion of the traded for service provisioning.

The network management module 114 also performs certain tasks associated with posted order matching. For example, the network management module 114  
25 verifies the network of the selling trading-member. This may be done by checking

that the trading-member's network has available capacity to meet the terms of the proposed transaction. The network management module 114 may also verify that the VTF system's communication network availability to ensure that the network has adequate available capacity to meet the proposed trade. If capacity is not available at  
5 the time of an initial verification test, e.g., during attempted execution of a proposed trade, a passive verification may be initiated by the network management module 114 that may notify the order matching process when availability occurs.

Once a match is found and a trade is made, the VTF system 100 then provides the appropriate connections and routing. This may be done by the trade provisioning  
10 module 126 setting up the appropriate entries in the routing tables of the softswitch 112 for the trunks of the exchange points 102 involved in the trade. In one embodiment, the network management module 114 has access to the remote switching equipment 110 at each exchange point 102 and network management module 114 is able to update the these tables in conjunction with the operation and/or  
15 indication of the trade provisioning module 126.

The network management module 114 may also perform various tasks related to trade execution. For example, the network management module 114 may output information about a trade to the trade provisioning module 126 to generate a service order to be used by the trade provisioning module 126 for provisioning the traded for  
20 service. The network management module 114 may also notify the trading-member and the account management module 124 to confirm execution of a trade. This may be done by outputting some indicia that provisioning of the network is complete for a particular transaction to both the trading-member 106 and the account management module 124.

The call processing module 112 may be for example a softswitch. The call processing module 112 performs dynamic routing to deliver calls across the network administered by the owners and/or operators of the trading floor. The call processing module 112 also provides call detail records to the VTF information repository 120.

5       The trade provisioning module 126 administers trades performed on the VTF 118. The member support module 128 provides facilities for addressing and handling problems with posting, analyzing or executing trades problems for trading-member 106.

10       The membership management module 130 supports opening account profiles for new trading-members, granting trading-members access to the trading floor, and granting trading authorization. The membership management module 130 establishes an identity of a trading-member 106 by verifying that the applicant for trading-member status fulfills the necessary criteria, for example, a telecommunications carrier that has an excess or shortage of data communication capacity. Additionally, 15       the membership management module 130 sets up an inactive account profile using information provided by the applicant for trading-member status and, potentially, information provided by a credit check of the applicant. As illustrated in FIGURE 2, the membership management module 130 may also be coupled to one or more financial institutions to, e.g., make financial transactions with accounts.

20       The membership management module 130 also determines whether a threshold of required funds has been met by the applicant for trading-member status by checking the applicant's account(s) for deposit of a requisite amount of funds. The membership management module 130 then activates the applicant's trading-member status by, for example, rendering the applicant's profile active and assigning a 25       personal identification number or code to the trading-member. Additionally, the

membership management module 130 generates a bill record by assessing initial fees charges the newly activated trading-member. The membership management module 130 also performs tasks associated with trading-member authentication and trading floor security by requiring input of specific types of information, e.g., a user  
5 identification code and password, prior to a trade being posted, settled, provisioned, etc.

As illustrated in Figure 2, the trade provisioning module 126 includes a trade order posting module 1262, a trade order matching module 1264 and a trade execution/confirmation module 1266.

10 The trade order posting module 1262 provides facilities for a trading-member 106 to post a trade order, e.g., buy or sell orders. The trade order posting module 1262 does this by receiving buy/sell order parameters and outputting network capacity inventory information to trading-members 106 to assist the trading-members in entering the parameters. The trade order posting module 1262 also provides ASR  
15 measurements if available. The trade order posting module 1262 determines the feasibility of that proposed trade order and the trading-member's ability to cover the associated costs based on information provided by the account management module 124. The trade order posting module 1262 also verifies network capacity based on the buy/sell order by checking the trading-member specified trunk-group/network  
20 capacity availability for the corresponding dates on the posted order.

The trade order matching module 1264 performs an analysis to locate corresponding trade orders, e.g., buy or sell orders, that are also proposed trades and then either executes the proposed trade to generate a trade agreement if conditions are met or presents potential trades for a negotiation process between interested trading-  
25 members 106.



The transaction execution/confirmation module 1266 initiates and controls the trade provisioning process, billing process and trading-member notification once a confirmed transaction has been executed.

Each exchange point 102 must subscribe to the VTF 118 (thus becoming a trading-member 106) in order to be able to trade on the VTF system 118. The VTF 118 must be able to access (directly or otherwise) the switching tables at the remote switching equipment 110 at each subscriber exchange point 102. Preferably, trading-members 106 in the system 100 are connected to the VTF 118 through a publicly accessible network 116, e.g., either the Internet or a dedicated Intranet connection, allowing them to view the activity on the VTF 118 from a browser-based portal. This portal may provide a user associated with the trading-member 106 with graphical tools for posting trade orders, confirming transactions and monitoring account activity. A browser interface provided by the browser-based portal may include modules supporting reporting on: account activity, transaction history, order monitoring, network profiling, network performance, messaging, market watching and/or historical market transactions.

Once a confirmed trade has been executed, components of the VTF system 100 are triggered to provision the appropriate network elements to fulfill the agreement specified in the trade. The elapsed time from transaction execution to network fulfillment may be as little as three minutes or less.

As mentioned above, provision of communication connections between exchange points 102 involves establishing and posting a requirement for a particular exchange point 102 and determining whether there is another exchange point (entity) that can meet that requirement. For example, an exchange point 102 located in New York might determine that it needs a certain capacity (e.g., 100 simultaneous calls of

a particular quality, i.e., having a certain minimum QoS, at a given date and time) to an exchange point 102 located in Chicago.

The particular requirements for an exchange point 102 may be posted to the VTF 118 in the form of buy orders, whereas the particular availability of exchange  
5 points may be posted to the VTF 118 as sell orders. The VTF 118 stores the various pending buy and sell orders in an order database located, for example, in the VTF information repository 120.

As explained above, in addition to matching trades and provisioning of telecommunications products and/or services, the VTF system 100 performs a number  
10 of other functions, including billing and other administrative functions. Since, in exemplary embodiments of the invention, each trading-member 106 must be a pre-established subscriber to the VTF system 100, each trading-member 106 preferably has an account with the VTF 118.

In addition to acting as a trading floor, the VTF system 100 can also police  
15 and monitor trades and subsequent product and/or service usage. This is especially important since many trades include some measure of quality (e.g., QoS) as part of the commodity being traded. Thus, in some exemplary embodiments, the VTF system 100 may monitor (using, for example, the remote switching equipment 110, as well as outboard monitoring equipment) the quality of connections between the  
20 origination in the buying trading-member's communication network and the termination location in the selling trading-member's communication network. This information may be provided to trading-members 106 or accessible by the trading-member support module 128 illustrated in Fig. 1.

FIGURE 3 is a flowchart depicting operations associated with trade order  
25 posting according to an exemplary embodiment of this invention. As shown in

FIGURE 3, operations begin at 300 and control proceeds to 305. At 305, a trading-member is logged on for trading on the VTF system. Control then proceeds to 310, at which a determination is made whether the identity of the trading-member has been authenticated, e.g., via any one or more conventionally known mechanisms for  
5 identity authentication. If the trading-member's identity has been authenticated, control proceeds to 315. If not, control proceeds to 320, at which the operations end.

At 315, trade order parameters are received from the trading-member and control proceeds to 325. At 325, a determination is made, based on information input by the trading-member, what type of order the trading-member wants to make. If the  
10 information indicates that the trading-member wants to sell products and/or services, control proceeds to 330. If the information indicates that the trading-member wants to buy products and/or services, control proceeds to 360.

At 330, information is received from the trading-member indicating the product and/or service the member wishes to sell. Control then proceeds to 335, at  
15 which parameters related to the sale trade order are received from the trading-member. Control then proceeds to 340, at which verification of the selling trading-member's communication network capacity is performed and a determination is made whether the selling trading-member's network has the capacity to fulfill the sale trade order. If the trading-member's communication network has the capacity, control  
20 proceeds to 345. If not, control proceeds to 350, at which an error message is output and control proceeds to 325 to receive new information from the trading-member, e.g., corresponding to another trade.

Control then proceeds to 345, at which a verification of the selling trading-member's account funds is performed and a determination is made whether the selling  
25 trading-member's account has the necessary funds to cover the fees and costs

associated with the trade. If the trading-member's account has sufficient funds, control proceeds to 380. If not, control proceeds to 355, at which an error message is output and control proceeds to 325 to receive new information from the trading-member, e.g., corresponding to another trade.

5           At 360, information is received from the trading-member indicating the product and/or service the member wishes to buy. Control then proceeds to 365, at which parameters related to the buy trade order are received from the trading-member. Control then proceeds to 370, at which verification of the buying trading-member's communication network capacity is performed and a determination is made  
10 whether the buying trading-member's network has the capacity to utilize or implement the buy trade order. If the trading-member's communication network has the capacity, control proceeds to 375. If not, control proceeds to 350, at which an error message is output and control proceeds to 325 to receive new information from the trading-member, e.g., corresponding to another trade. At 375, verification of the  
15 buying trading-member's account funds is performed and a determination is made whether the buying trading-member's account has the necessary funds to cover the fees and costs associated with the trade. If the trading-member's account has sufficient funds, control proceeds to 380. If not, control proceeds to 355, at which an error message is output and control proceeds to 325 to receive new information from  
20 the trading-member, e.g., corresponding to another trade.

At 380, the trade order is posted, i.e., accepted in a posting queue, for review for potential matching with other trade orders.

When a new trade order (buy or sell) is posted on the VTF 118, the trade order matching module 1264 of the trade provisioning system 126 attempts to match the  
25 new trade order with appropriate orders stored in the VTF information repository 120.

If a match is found (a matching buy and sell order are found), then the trade is made and the appropriate connections are established as explained below. Following the finding of a match, the two matching trade orders are removed from the VTF information repository 120. On the other hand, if no match is found for the new  
5 order, then the new trade order is input and stored in the VTF information repository 120 for subsequent reconsideration during potential matching with subsequent trade orders. Note that since the product or service being traded is time sensitive, outdated orders may be removed from the VTF information repository 120 as soon as they are no longer valid. It should also be appreciated that the matching algorithm performed  
10 by the trade order matching module 1264 should be able to find inexact matches between trades, because it is unlikely that two orders will exactly match.

FIGURE 4 is a flowchart depicting an order of matching operations according to an exemplary embodiment of the present invention. As illustrated in FIGURE 4, operations for determining whether there are matching buy/sell trade orders begin at  
15 400 and control proceeds to 405. At 405, a newly posted trade order is selected for analysis for matching. Control then proceeds to 410, at which trade order of a type corresponding to the selected trade order are selected, e.g., when a buy order is selected all sell orders are selected, when a sell order is selected all buy orders are selected. Control then proceeds to 415, at which all of the selected corresponding  
20 type orders that have the location identified in the analyzed trade order are selected. Control then proceeds to 420, at which selection of all of the trade orders resulting from the operation at 415 and that are acceptable based on political restrictions included in the analyzed trade order is performed. The results provided at 420 are a list of potential trade order matches.

Control then proceeds to 425, at which the potential trade order matches are checked against the selected trade order to determine whether the trade orders have matching rates. Control then proceeds to 430, at which the potential trade order matches are checked against the selected trade order to determine whether the trade orders have matching ASRs. Control then proceeds to 435, at which the potential trade order matches are checked against the selected trade order to determine whether the trade orders have matching quantities. Control then proceeds to 440, at which the potential trade order matches are checked against the selected trade order to determine whether the trade orders have matching QoS. Control then proceeds to 445, at which the potential trade order matches are checked against the selected trade order to determine whether the trade orders have matching intervals (e.g., the period of time in which the trade is active).

Control then proceeds to 450, at which a match rating is assigned to each of the potential trade order matches based on the degree and frequency with which the potential trade order matches matched the selected trade order. Control then proceeds to 455, at which a determination is made whether there are any potential trade orders matches that are an exact match to the selected trade order. If so, control proceeds to 470. If not, control proceeds to 460.

At 460, the potential trade order matches are output to the trading-member with some indicia of a degree of matching between each of the potential trade order matches and the selected trade order. Accordingly, a subsequent negotiation may take place, in accordance with commonly understood practices, in which the trading-member associated with the selected trade order may negotiate with one or more of the trading-members associated with the potential trade order matches. As a result, it is foreseeable, that certain criteria included within either the selected trade order or

one of the potential trade order matches may be altered so as to provide a match.

Such a situation would provide a successful negotiation. Accordingly, at 465 a determination is made as to whether a successful negotiation has occurred. If it has, control proceeds to 470. If it has not, control proceeds to 495, at which the matching  
5 algorithm ends for the newly posted and selected trade order.

At 470, the buying trading-member's account is checked to insure that there are sufficient funds to support the fees and costs associated with the trade. Control then proceeds to 475, at which the selling trading-member's account is checked to confirm that there are sufficient funds to support the fees and costs associated with the  
10 trade. Control then proceeds to 480, at which the capacity and availability of the buying trading-member's communication network is checked to confirm that it can support the trade. Control then proceeds to 485, at which the capacity and availability of the selling trading-member's communication network is checked to confirm that it can support the trade. Control then proceeds to 490, at which the capacity and  
15 availability of the VTF's communication network is checked to ensure that it can support the trade. Control then proceeds to 495, at which the exemplary operations performed for matching a particular trade order to other trade orders ends. Following these operations the matching trade orders may be paired and analyzed to produce a trade/transaction agreement including the information about the trade.

20 **FIGURE 5** is a flowchart depicting transaction execution according to an exemplary embodiment of this invention. As shown in **FIGURE 5**, transaction execution begins at 500 and control proceeds to 505. At 505, execution of a particular trade/transaction is requested, for example, based on information stored in the VTF system repository and/or control of the network management module. Control then  
25 proceeds to 510, at which a service order is generated based on information included,

e.g., in the matched trade orders and/or the trade/transaction agreement. Control then proceeds to 515, at which the VTF network is provisioned to support the traded for delivery of the products and/or services described in the service order. Control then proceeds to 520, at which the trade/transaction is confirmed by providing

5 confirmation information to the trading-members. Simultaneously, subsequently or prior to the operations performed at 510-520, bill records may be generated at 525 to bill for the trade/transaction. Control then proceeds to 530, at which the execution of the trade/transaction is complete.

As described above, the capacity requirements of a particular exchange point

10 102 may be determined statically, often by exchange operators and/or administrators. Capacity requirements may be established weeks or even months in advance and trades may be made long before the capacity is needed.

Such a system, while useful, lacks the ability to adapt to quickly changing usage and demands. For example, a sudden and unexpected demand for a particular

15 service may go unmet. In addition, the requirement of early pre-planning means that unused capacity may go wasted.

Even if a particular exchange point 102 has sufficient capacity to meet its needs, it may still be desirable for that exchange point to attempt to obtain new (e.g., cheaper) capacity. For example, a particular exchange point 102-A may have more

20 than one entry in its switching table for connections at a given time to another exchange point 102-B. For example, exchange point 102-A, located in New York, may have multiple entries for connection to exchange point 102-B, located in Miami. The multiple entries may be the result of different trades using the VTF system 100. Each entry may correspond, therefore, to a different price for the same product and/or

25 service. Or each entry may have a different quality of service associated therewith.



When exchange point 102-A needs to connect an exchange customer to exchange point 102-B, it preferably uses its lowest cost (and possibly highest QoS) connection first. When all the lowest cost connections are in use, the exchange's customer will be connected using the next lowest cost, etc. The following table,

5 Table 1, provides an example of switching table entries at exchange point 102-A (New York) for connections to exchange point 102-B (Miami):

	To Exchange Point	No. of Simultaneous calls	QoS (minimum)	Cost/minute
1	Miami	100	1	0.03
2	Miami	100	1	0.07
3	Miami	100	2	0.04
4	Miami	50	2	0.05

TABLE 1

Note that the Table 1 shown above does not include all of the information in the switching table entry for a particular exchange point 102. Assuming for the sake  
 10 of this explanation that a lower value for QoS provides a higher quality service, exchange point 102-B would preferably establish connections to Miami using entry number one (highest QoS and lowest cost). Once all the capacity provided by entry number one is in use, new calls can be established either at the lower cost of entry number four (if QoS of "2") is acceptable, or using entry number 2.

15 However, it is possible that at any given time more capacity becomes available between any two exchange points. Thus, for example, at any time, more capacity may become available between New York and Miami. If this is the case, exchange point 102-A may benefit from obtaining this capacity, either because it has reached its capacity limits or because the new capacity is better (cheaper, has better QoS, etc.)  
 20 than its current capacity.

To support real-time trading and provisioning, in the exemplary embodiments of the VTF system 100, some (or all) of the trading-members 106 have intelligent

agents (IAs) 122 associated therewith. An IA 122 is a mechanism that may operate, e.g., on a general or specific purpose computer system and/or may be implemented as an expert system allowing the agent to learn from previous actions taken and resulting consequences. The IA 122 for a particular trading-member 106 periodically (or  
5 continuously) examines the current state of the actual connections between the remote switching equipment 110 at the exchange point 102 with the capacity reflected in the switching table entry for that exchange point 102.

If the IA 122 determines that the capacity is excessive, it may post (to the VTF 118) a sell order for some of the excess capacity. On the other hand, if the IA 122  
10 determines that the current capacity may soon not be met, the IA 122 may post a buy order to the VTF 118 for more capacity. In addition, the IA 122 may post a buy order for capacity that is better (by some measure such as, e.g., cost and/or QoS) than some of its current capacity. For example, using the values shown in Table 1 above, the intelligent IA 122 at exchange point 102-A may post a buy order for capacity from  
15 New York to Miami with a QoS better than 2 and a cost below 0.07. If a match is found and a trade is made, the IA 122 could then post a sell order for its worst (by some measure) capacity.

In some exemplary embodiments, capabilities of an IA 122 may be limited to only placing buy orders, since excess capacity may be held for reasons outside the  
20 IA's realm of understanding or reasoning. In other embodiments, capacity (i.e., entries in the switching table) can be tagged as tradable by IAs. For example, an IA 122 may configured to be able to trade capacity, which it acquired. In still other embodiments, IAs 122 may be able to place sell orders as long as the total number of simultaneous calls is kept above some predetermined threshold value.

Note that a limitation on the frequency of capacity trading is speed of provisioning. However, it is possible for an IA 122 to trade capacity that has not even been provisioned (i.e., it is possible, in some embodiments, for an IA 122 to buy and/or sell capacity without ever having the entries created in the switching table).

- 5 Other than for the limitation on the speed of provisioning, IA 122 for each of the exchange points 102 may trade capacity in real time, thereby avoiding any excess capacity.

From the perspective of the VTF 118, trades posted by IA 122 of trading-members 106 may be treated like any or all other trades. Moreover, both matching  
10 and provisioning performed within the system 100 may take place using the same mechanisms and algorithms explained above.

Although described above with regard to a general trading floor, in some embodiments, the VTF 118 may be a limited or specialized trading floor. Examples of such trading floors, without limitation, include:

- 15       • **Minutes Trading Floor** on which telecommunication firms can buy and/or sell international and national PSTN (TDM), VOIP and mobile (GSM) minutes for termination. Trading-members can post both bid and ask prices for origination and termination rates. A bid (i.e., a buy termination) is when a trading-member is willing to buy termination for a  
20       quantity of originating minutes, at a desired rate and into a specific location. An ask (i.e., a sell termination) is when a trading-member is willing to sell termination for a quantity of minutes, at a desired rate and into a specific location.
- 25       • **Bandwidth Trading Floor** on which telecommunication firms can buy, sell or lease international and national bandwidth. Trading-members can

post both bid and ask prices for bandwidth between desired A to Z locations, by transmission rate and protocol type. A bid (buy) is when a trading-member is willing to buy a specified transmission type (FO, Sat. or MW), protocol and rate, between any two end points, with or without add drop locations. An ask (sell) is when a trading-member is willing to sell a specified transmission type (FO, Sat. or MW), protocol and rate between any two end points, with or without add drop locations.

- **Dark Fiber Trading Floor**, in which telecommunication firms can buy, sell or lease international and national dark fiber. Trading-members can post both bid and ask prices for dark fiber between desired A to Z locations, by fiber type and contract terms. A bid (buy) is when a trading-member is willing to buy a specified quantity of dark fiber between any two end points, with or without add drop locations. An ask (sell) is when a trading-member is willing to sell a specified quantity of dark fiber between any two end points, with or without add drop locations.

- **Rights-of-way Trading Floor**, in which telecommunication firms can buy, sell or lease international and national right of way space for the installation of transmission cable systems. Trading-members can post both bid and ask prices for rights of way between desired A to Z locations, by type, size and contract terms. A bid (buy) is when a trading-member is willing to buy a specified quantity of right of way space between any two end points. An ask (sell) is when a trading-member is willing to sell a specified quantity of right of way space between any two end points.

- **Collocation Trading Floor** in which telecommunication firms and/or Internet Service Providers (ISPs), Application Service Providers (ASPs) or

others can buy, sell or lease collocation space that may be used, for

example, for the installation of buyers'/leasers' service equipment.

Trading-members can post both bid and ask prices for collocation space in  
desired geographic locations, by type, size and contract terms. A bid (buy)

5 is, when a trading-member is willing to buy a specified quantity of

collocation space. An ask (sell) is when a trading-member is willing to

sell a specified quantity of collocation space.

Thus are provided systems, methods and devices, including, incorporating or  
cooperating with a virtual trading floor and associated intelligent agents for various

10 products and/or services (including, without limitation, minutes, bandwidth, dark  
fiber, ducts, IPT collocation products and other measures of capacity).

It should be appreciated that the modules described above may be  
implemented in hardware, software, or any combination thereof.

While this invention has been described in conjunction with the specific  
15 embodiments outlines above, it is evident that many alternatives, modifications and  
variations will be apparent to those skilled in the art. Accordingly, the preferred  
embodiments of the invention, as set forth above, are intended to be illustrative, not  
limiting. Various changes may be made without departing from the spirit and scope  
of the invention.

**WHAT IS CLAIMED:**

1. A system for trading telecommunications services or products, the system comprising:

5 a virtual trading floor coupled to communication equipment belonging to at least two trading-members that are registered to perform trades on the virtual trading floor for telecommunication services or products;

a communication network including a plurality of exchange points, each exchange point being connectable to each other exchange point by switching  
10 equipment associated with each respective exchange point, wherein each trading-member is connectable to the virtual trading floor to trade connection capacity between the exchange points, and wherein two exchange points connectable .

2. The system of claim 1, wherein the communication equipment  
15 belonging to the at least two trading-members is coupled to the virtual trading floor via a publicly accessible network.

3. The system as in claim 1 wherein the virtual trading floor is constructed and adapted to:

20 match buy and sell orders from trade orders made by the trading-members; and

provision a connection between respective ones of the plurality of exchange points after a match has been made based on information contained in the trade orders.

4. The system of claim 3, wherein the connection capacity is delivered between and among ones of the plurality of exchange points by use of a mesh core network.

5. The system of claim 1, wherein a trade order made by a trading-member is formulated by an intelligent agent operated by the trading-member, the intelligent agent being configured to automatically trade connection capacity on the virtual trading floor based on connection requirements of the trading-member's connection equipment.

6. The system of claim 5 wherein the intelligent agent is configured to purchase connection capacity based on the connection requirements of the trading-member's communication equipment.

7. The system of claim 5 wherein the intelligent agent is configured to sell existing capacity when the existing connection capacity is not required by the trading-member's communication equipment.

8. The system of claim 5 wherein the intelligent agent module is configured to purchase connection capacity if such a trade would provide connection capacity at a lower cost than currently used connection capacity costs.

9. The system of claim 5 wherein the intelligent agent module is configured to buy connection capacity for a user programmed marketing event.

10. The system of claim 5 wherein the intelligent agent module is configured to buy connection capacity for disaster recovery, which is when the trading-member has a lost at least some portion of the connection capacity that the communication equipment was utilizing.

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11. The system of claim 5 wherein the intelligent agent module is configured to buy and sell connection capacity on a pre-programmed basis corresponding to time-of-day, week or month.

10

12. A system comprising:

(A) a virtual trading floor coupled to communication equipment belonging to at least two trading-members that are registered to perform trades on the virtual trading floor for telecommunication services or products;

15

(B) a communication network including a plurality of exchange points, each exchange point being connectable to each other exchange point by switching equipment associated with each respective exchange point, wherein each trading-member is connectable to the virtual trading floor to trade connection capacity between the exchange points, and wherein two exchange points connectable;

(C) wherein the virtual trading floor is constructed and adapted to:

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(c1) match buy and sell orders from trading-members; and

(c2) provision a connection between at least two of the plurality of exchange points after a match has been made based on information included in the matched orders, and

(D) wherein at least one trading-member utilized an intelligent agent

25

constructed and adapted to automatically trade connection capacity on behalf of that



trading-member's pre-programmed parameters, wherein the intelligent agent module is constructed and adapted to

(d1) buy new capacity when current capacity is close to being exceeded;

5 (d2) sell existing capacity when the existing capacity is not needed; and

(d3) buy new capacity if such a trade would provide capacity of a lower cost than current capacity.

(d4) buy capacity for a user programmed marketing event

10 (d5) buy capacity for disaster recovery, meaning the user has a loss of another supplier and requires a short term contract to fulfill current capacity requirements.

(d6) buy and sell capacity on a pre-programmed basis for time-of – day, week or month.

15

13. In a telecommunications system in which a plurality of exchange points, are each connectable to each other exchange point by switching equipment associated with each respective exchange point:

20 a virtual trading floor, wherein each exchange point is connectable to the virtual trading floor to trade connection capacity between the exchange points.

14. A virtual trading floor as in claim 13 wherein the exchange points connect to the virtual trading floor via the Internet.

15. A virtual trading floor as in claim 13 wherein the virtual trading floor is constructed and adapted to:

match buy and sell orders from respective ones of the plurality of exchange points; and

5 provision a connection between respective ones of the plurality of exchange points after a match has been made.

16. A virtual trading floor as in claim 13 wherein each exchange point further comprises:

10 an intelligent agent module constructed and adapted to automatically trade connection capacity on behalf of that user's pre-programmed parameters by site, and wherein the virtual trading floor is further constructed and adapted to accept trades from an intelligent agent module and to perform trades posted by an agent module.

15 17. In a telecommunications system in which a plurality of exchange points, are each connectable to each other exchange point by switching equipment associated with each respective exchange point:

a virtual trading floor, wherein at least two trading-member accesses  
20 the virtual trading floor to trade connection capacity between the exchange points, wherein the virtual trading floor is constructed and adapted to:

match buy and sell orders from trading-members; and

provision at least one connection between two exchange points after a match has been made based on the matched buy and sell orders,

wherein at least one trading-member utilizes an intelligent agent constructed and adapted to automatically trade connection capacity on behalf of that trading-member's pre-programmed parameters, and wherein the virtual trading floor is further constructed and adapted to accept trades from the intelligent agent and to perform trades posted by the intelligent agent.

18. In a telecommunications system in which a plurality of exchange points are each connectable to each other exchange point by switching equipment associated with each respective exchange point and wherein a trading floor system is constructed and adapted to accept trades from a trading-member and to perform trades posted by a trading-member and in which the trading floor is configured so that trading-members can trade connection capacity between the exchange points, wherein the trading floor system is further constructed and adapted to:

match buy and sell orders from trading-members; and  
provision a connection between a plurality of exchange points after a match has been made, based on the matched buy and sell orders.

19. The trading floor system of claim 18, wherein the trading floor receives at least one of a buy or sell order from an intelligent agent constructed and adapted to automatically trade connection capacity on behalf of a trading-member's pre-programmed parameters.

20. A system configured to support exchange of telecommunications products or services by trading-members, the system comprising:

a virtual trading floor; and

a system communication network including a plurality of exchange points, each exchange point being connectable to each other exchange point within the system communication network by switching equipment associated with each respective exchange point,

5            wherein each trading-member is connectable with the virtual trading floor to trade connection capacity between exchange points within the system communication network.

21.        The system of claim 20, wherein the telecommunications products or  
10        services are one of minutes, bandwidth, dark fiber, ducts, and Internet protocol telephony collocation products.

22.        The system of claim 20, further comprising network management elements that provision and maintain a communication network associated with  
15        operation of the virtual trading floor, the network management elements dynamically managing call routing within the communication network administered by the system.

23.        The system of claim 20, exchange may also include account management elements, which manage trading-member accounts and billing and settlement  
20        operations.

24.        The system of claim 20, wherein access to the virtual trading floor by trading-members is provided via a user interface that is accessible via a publicly accessible network.

25. The system of claim 20, wherein trading may be performed in conjunction with the use of an intelligent agent, wherein the intelligent agent is a user programmable module programmed by a trading-member.

5        26. The system of claim 25, wherein the intelligent agent is programmed to perform trading decisions based on time-of-day.

27. The system of claim 25, wherein the intelligent agent is programmed to perform trading decisions based on marketing events.

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28. The system of claim 25, wherein the intelligent agent is programmed to perform trading decisions based on disaster recovery conditions.

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29. The system of claim 25, wherein the intelligent agent performs trading decisions based on conditions associated with the trading-member's communication network.

20

30. The system of claim 25, wherein the intelligent agent interfaces with the system via an application protocol interface into a least-cost routing system operated by the trading-member.

25

31. The system of claim 30, wherein the virtual trading floor outputs least-cost routing outputs and the trading-member's least-cost routing system continually monitors these least-cost routing outputs.

32. The system of claim 31, wherein the trading-member's least-cost routing system notifies the trading-member's intelligent agent of trade conditions on the virtual trading floor.

5        33. The system of claim 25, wherein the intelligent agent is configured to trade to acquire additional connection capacity when current capacity provided by the trading-member's communication network is exceeded.

10       34. The system of claim 25, wherein the intelligent agent is configured to trade to dispose of existing connection capacity provided by the trading-member's communication network when the existing connection capacity is not needed by the trading-member.

15       35. The system of claim 25, wherein the intelligent agent is configured to trade to acquire additional connection capacity if such a trade would provide capacity of a lower cost than current capacity.

20       36. The system of claim 20, wherein, In some exemplary embodiments, the one or more of the trading-members connect to the virtual trading floor via a publicly accessible communication/data network such as the Internet.

37. The system of claim 20, wherein the system communication network is a global, core, mesh network.

38. The system of claim 20, wherein the system communication network utilizes asynchronous transfer mode technology.

39. The system of claim 20, wherein the virtual trading floor is configured to match trade orders from trading-members and to provision a connection between exchange points associated with those trading-members after a match has been made.

40. The system of claim 20, wherein the trading-members are telecommunication carriers that have registered with virtual trading floor system and have been approved by the virtual trading floor system.

41. The system of claim 20, wherein connection capacity is the physical interconnection of at least one trunk into the system communication network at a defined termination location.

42. The system of claim 20, wherein the trading on the virtual trading floor system requires trading-members to pay at least one fee to the virtual trading floor system in exchange for a privilege of trading connection capacity on the virtual trading floor.

43. The system of claim 42, wherein the at least one fee is a connection fee charged to a trading-member for connection to the system communication network.

44. The system of claim 43, wherein the connection fee is set based on a cost per provisioned communications port.

45. The system of claim 44, wherein the connection fee is a one time charge assessed and posted at the completion of provisioning of an exchange point associated with the trading-member to which the charge is assessed.

5

46. The system of claim 42, wherein the at least one fee is a recurring port fee associated with a trading-member's use of a system communication network port.

47. The system of claim 46, wherein the recurring port fee is assessed against  
10 a trading-member as a monthly rate per provisioned communication port.

48. The system of claim 42, wherein the at least one fee is a transaction fee associated with posting a transaction on the virtual trading floor.

15 49. The system of claim 48, wherein the transaction fee is a commission charged by the virtual trading floor system, assessed against trading-members who have successfully negotiated a confirmed trade.

50. The system of claim 48, wherein the transaction fee is based on the traded  
20 volume of connection capacity.

51. The system of claim 50, wherein the trade volume is a product of traded trunk-group-minutes and a traded for rate.



52. The system of claim 42, wherein the at least one fee is a transaction fee associated with the generation of a service order in the virtual trading floor system.

53. The system of claim 52, wherein the transaction fee is a commission charged by the virtual trading floor system, assessed against trading-members who have successfully negotiated a confirmed trade.

54. The system of claim 52, wherein the transaction fee is based on the traded volume of connection capacity.

55. The system of claim 54, wherein the trade volume is a product of traded trunk-group-minutes and a traded for rate.

56. The system of claim 42, wherein the at least one fee is a reservation fee associated with a confirmed trade in the virtual trading floor system.

57. The system of claim 56, wherein the reservation fee is based on a calculation of a product of a rate charged for connection capacity and a number of units.

58. The system of claim 56, wherein the reservation fee is based on a calculation of a cost per unit of connection capacity and a number of units.

59. The system of claim 20, wherein once a trade order has been posted on the virtual trading floor, the posted trade is assigned a cypher code.

60. The system of claim 59, wherein the cypher code includes data indicating a city in which the connection capacity terminates, data identifying an involved system communication network port, data identifying at least one trunk providing the connection capacity and data identifying the trading-member posting the trade order.

61. The system of claim 20, wherein trade orders relating to connection capacity on trunks having the same termination location are grouped together to create a trade order suite.

62. The system of claim 61, wherein the termination node is the location at which physical interconnection between the system communication network and a trading-member's communication network.

63. The system of claim 20, wherein a trade order includes data indicating either the excess connection capacity available for trade or the connection capacity request to be filled.

64. The system of claim 20, wherein the trade order includes data indicating whether the trade is offering connection capacity or requesting connection capacity.

65. The system of claim 20, wherein the trade order includes data indicating to what type of connection capacity the trade order pertains.

66. The system of claim 20, wherein the trade order includes data indicating any political restriction associated with the trade order.

67. The system of claim 20, wherein the trade order includes data indicating a  
5 location of the termination point of the service or product.

68. The system of claim 20, wherein the trade order includes data identifying at least one trunk used to provision the service or product.

10 69. The system of claim 20, wherein the trade order includes data identifying a price rate associated with the provision of the service or product.

70. The system of claim 20, wherein the trade order includes an indication of a quality of the service or product.

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71. The system of claim 20, wherein the trade order includes an indication of a quantity of the service or product.

72. The system of claim 20, wherein the trade order includes a transaction  
20 interval associated with the trade order.

73. The system of claim 20, wherein each of the exchange points includes one or more local access concentrators that are configured to connect the exchange point to a trading-member's communication network.

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74. The system of claim 73, wherein each of the exchange points includes ATM switching equipment that is collocated with the access concentrators.

75. The system of claim 73, wherein operation of the exchange point is  
5 controlled by a trade provisioning module included in the virtual trading floor system.

76. The system of claim 75, wherein a system communication network is coupled to a trading-member's communication network via local switching equipment

10 77. The system of claim 75, wherein at least one connection involving a particular exchange point is governed by a switching table associated with an access concentrator at the exchange point.

78. The system of claim 77, wherein the switching table includes one or more  
15 entries for all other exchange points to which the exchange point is connectable.

79. The system of claim 78, wherein the switching table entries include information relating to quality of service.

20 80. The system of claim 78, wherein a trade for service or product is provisioned by establishing a communication connection from one trading-member's communication network to another trading-member's communication network through a first access concentrator included in a first exchange point, which is coupled to the first trading-member's communication network, and a second access

concentrator included in a second exchange point, which is coupled to the second trading-member's communication network.

81. The system of claim 20, further comprising an account management  
5 module and an information repository coupled together, wherein the account management module performs billing for contractual fees and trade settlements associated with trading on the virtual trade floor.

82. The system of claim 81, wherein the account management module verifies  
10 account information corresponding to trade orders by verifying trading-member accounts for fund availability.

83. The system of claim 81, wherein the account management module verifies  
15 account information corresponding to trade orders by verifying trading-member accounts for credit standing.

84. The system of claim 81, wherein the account management module is  
coupled to and in communication with at least one financial institution with a trading-  
member's account.

20

85. The system of claim 20, further comprising a network management  
module and an information repository coupled together, wherein the network  
management module performs system communication network provisioning and  
management activities.

25

86. The system of claim 85, wherein the network management module estimates service provisioning completion dates by providing status of the estimated and actual completion dates of the service provisioning.

5           87. The system of claim 85, wherein the network management module updates trading-members' system accounts with network elements by providing a network element inventory upon completion of provisioning of a traded for service or product including at least one of trunk group identification data, port identification data, data indicating connection capacity, or data indicating a termination location.

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88. The system of claim 86, further comprising a trade provisioning module that incorporates routing table entries in the routing tables of a softswitch included in the communication network corresponding to trunks of exchange points involved in a trade.

15

89. The system of claim 86, further comprising a call processing module that performs dynamic routing to deliver traded for services or products.

20           90. The system of claim 89, wherein the call processing module is a softswitch that provides call detail records to the information repository.

91. The system of claim 88, wherein the trade provisioning module further comprises a trade order posting module that provides facilities for a trading-member to post a trade order, the trade order posting module receiving trade order parameters

and outputting network capacity inventory information to trading-members to assist the trading-members in entering trade parameters.

92. The system of claim 91, wherein the trade order posting module also  
5 provides ASR measurements to the trading-members.

93. The system of claim 88, wherein the trade provisioning module further comprises a trade order matching module that performs an analysis to locate proposed trade orders and either executes the proposed trade orders to generate a trade  
10 agreement if conditions are met or presents potential trades for a negotiation process between interested trading-members.

94. A method for supporting exchange of telecommunications products or services by trading-members, the method comprising:  
15 providing a virtual trading floor, at which trading-members can post trade orders for telecommunication services and products; and  
analyzing a posted trade order and determining whether criteria of the posted trade order match corresponding criteria in another trade order posted on the virtual trading floor;  
20 confirming a trade order match between two trade orders that have matching corresponding criteria;  
executing the trade order match; and  
provisioning a traded for service in a system communication network associated with the virtual trading floor by connecting a plurality of exchange

points included in the system communication network using switching equipment associated with each respective exchange point based on the trade order match,

wherein each trading-member is connectable with the virtual trading floor to trade connection capacity between exchange points within the system

5 communication network.



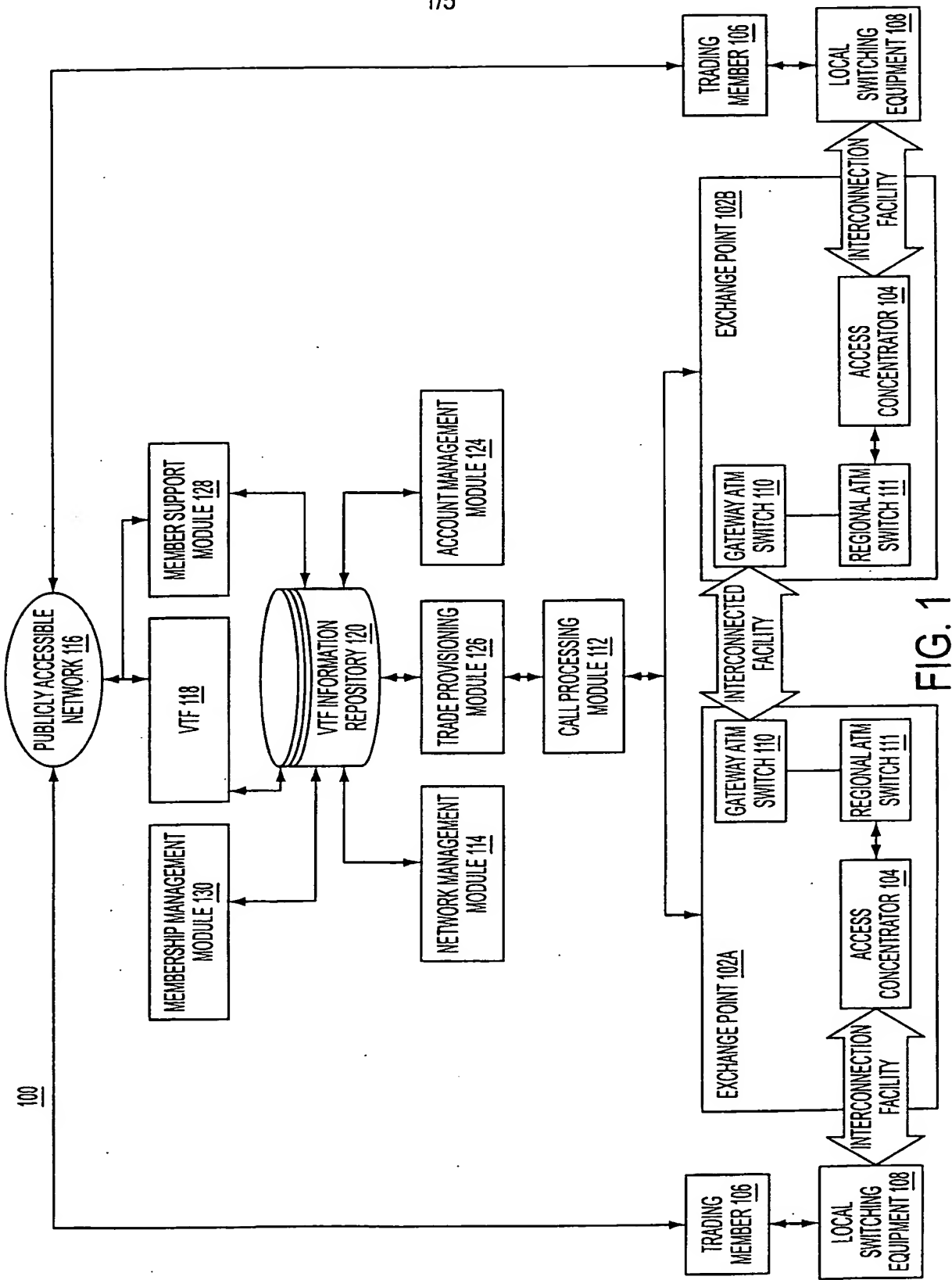


FIG. 1

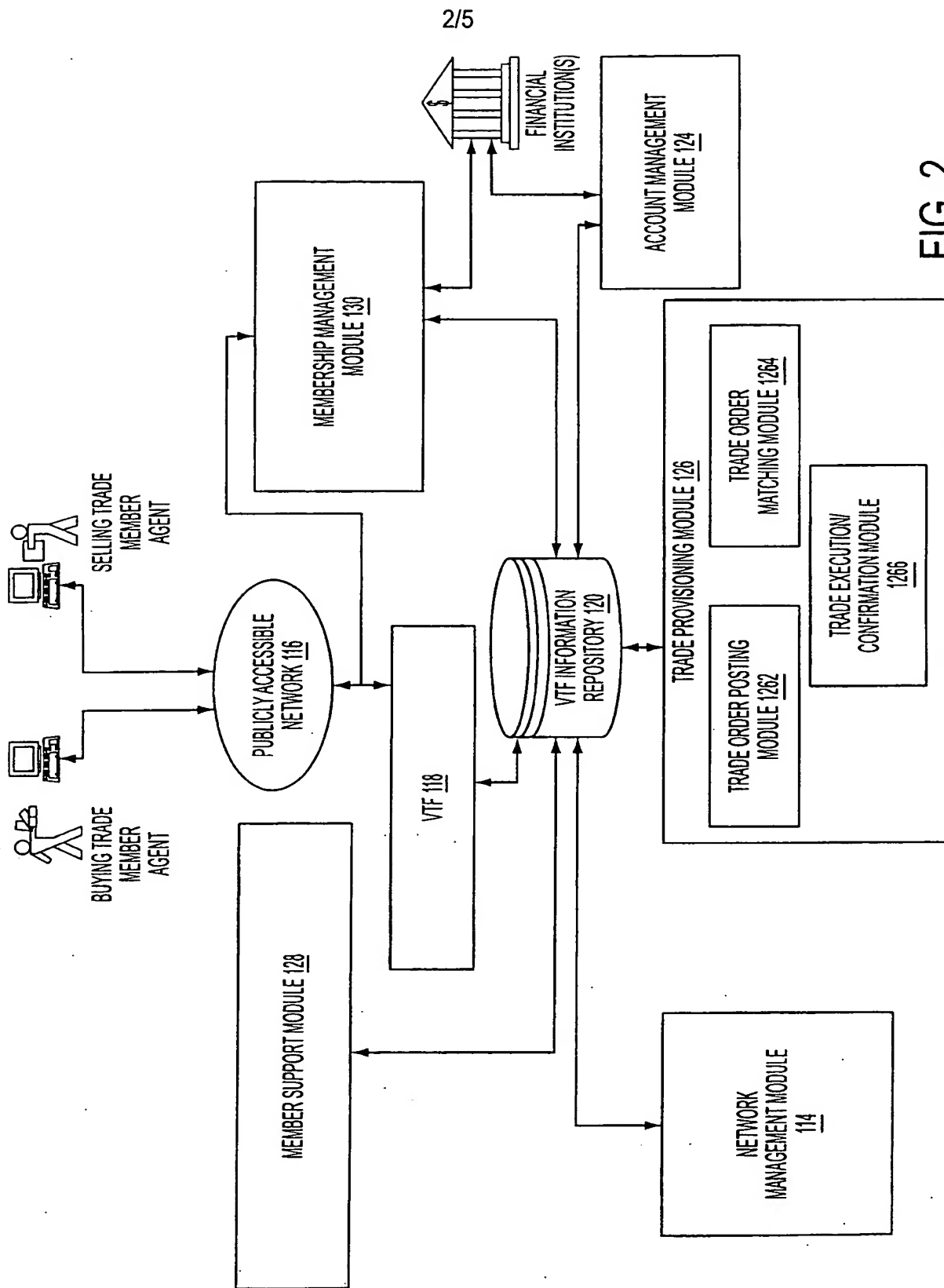


FIG. 2

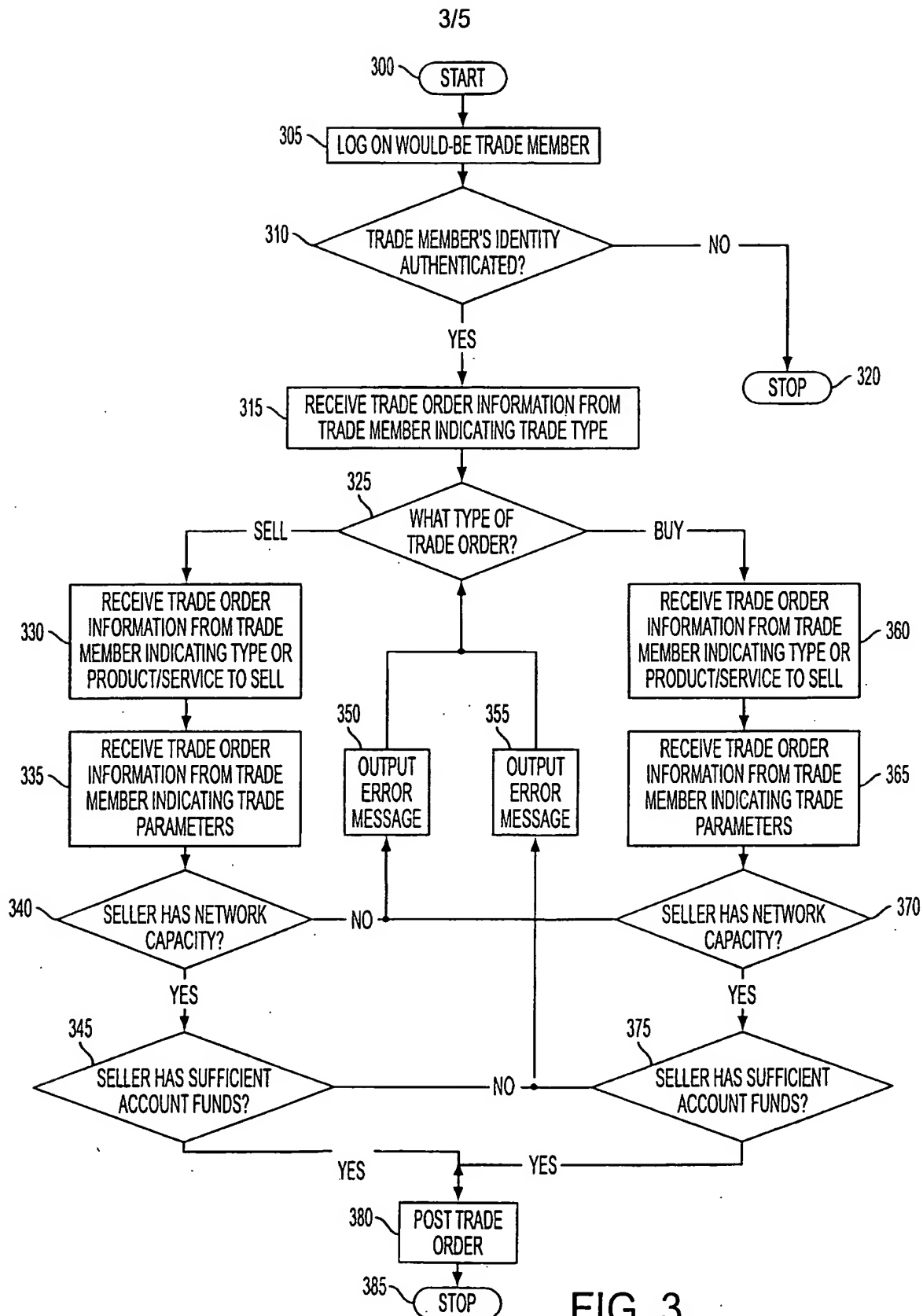


FIG. 3

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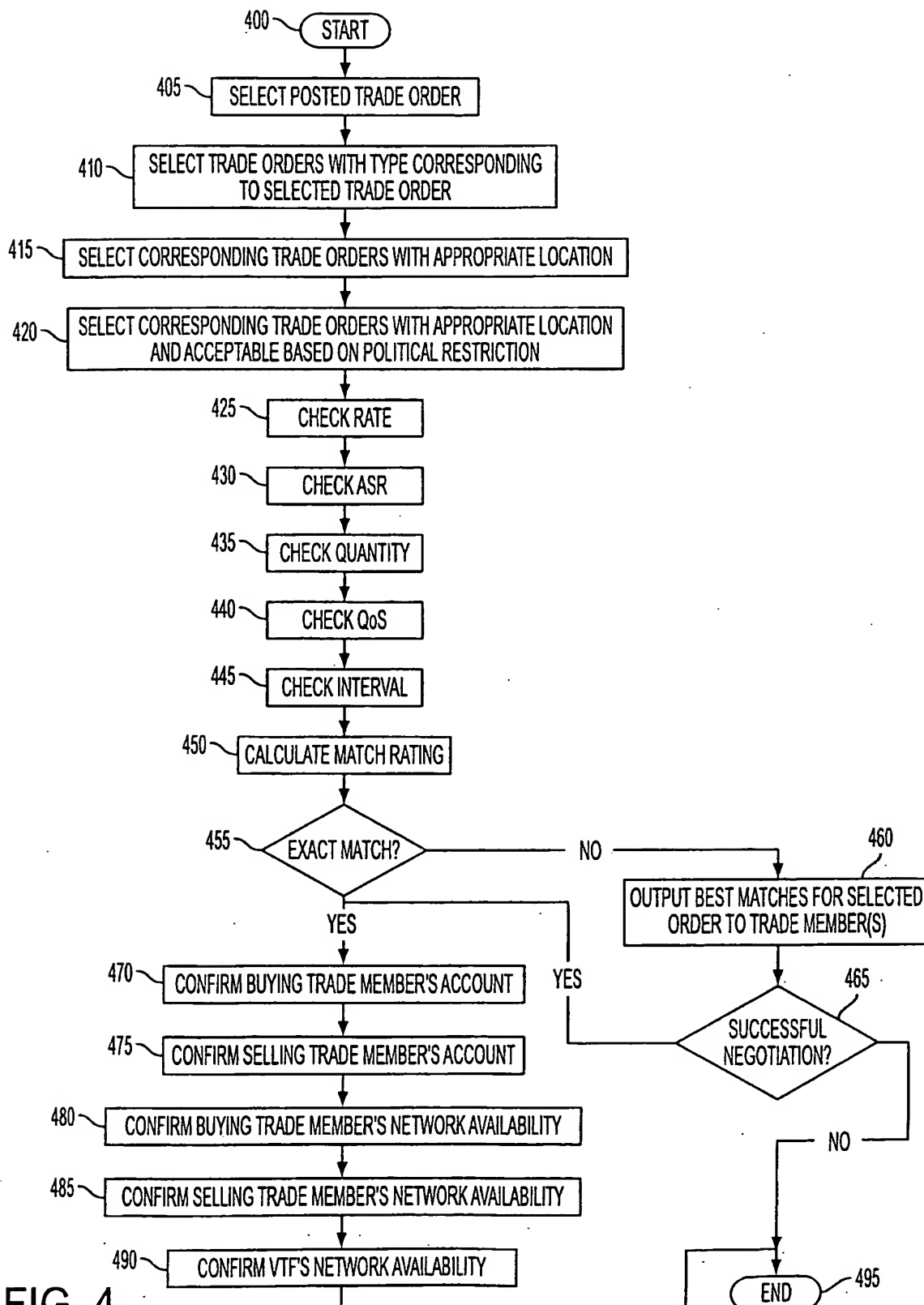


FIG. 4

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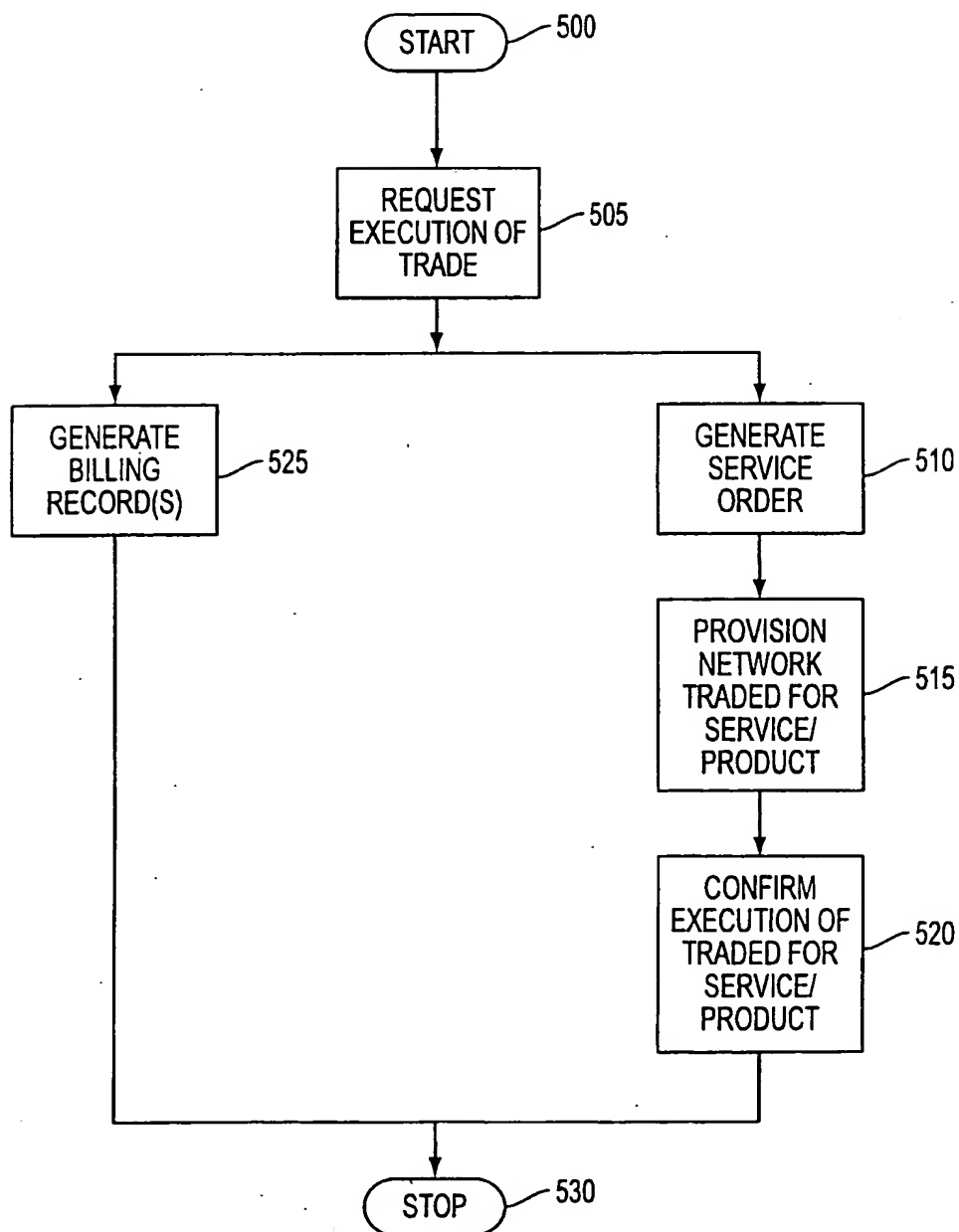


FIG. 5

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(54) Title: **VIRTUAL TRADING FLOOR AND INTELLIGENT AGENTS FOR TELECOMMUNICATIONS PRODUCTS AND SERVICES**

(57) Abstract: A system includes a virtual trading floor and a plurality of exchange points, each connectable to each other exchange point by remote switching equipment associated with each respective exchange point, wherein each exchange point is connectable to the virtual trading floor via the Internet to trade connection capacity between the exchange points. The virtual trading floor can match buy and sell orders from respective ones of the plurality of exchange points; and provision a connection between respective ones of the plurality of exchange points after a match has been made. Each exchange point further comprises an intelligent agent module constructed and adapted to automatically trade connection capacity on behalf of that user's pre-programmed parameters by site, wherein the agent module can buy new capacity when current capacity is close to being exceeded; sell existing capacity when the existing capacity is not needed; and buy new capacity if such a trade would provide capacity of a lower cost than current capacity; buy capacity for a user programmed marketing event; buy capacity for disaster recovery, meaning the user has a loss of another supplier for capacity and requires a short term contract to fulfill current capacity requirements; and to buy and sell capacity on a pre-programmed basis for time-of-day, week or month.



**WO 01/37509 A3**

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/30147

## A. CLASSIFICATION OF SUBJECT MATTER

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According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04L H04Q G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, INSPEC

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	HOL K: "BIT BY BID BY BIT DEMAND AND SUPPLY OF BANDWIDTH THROUGH ELECTRONIC AUCTIONS" 38TH EUROPEAN TELECOMMUNICATIONS CONGRESS. PROCEEDINGS NETWORKING THE FUTURE. UTRECHT, NL, AUG. 24 - 28, 1999, LONDON: IBTE, GB, 24 August 1999 (1999-08-24), pages 143-147, XP000847185	1-3, 13-15, 18,20, 21,23, 24,36, 39-42, 48-50, 52-54, 56,64, 69,70
Y	abstract  page 144, column 3, line 1 - line 23 page 145, column 1, line 19 -column 3, line 16 page 145, column 3, line 48 -page 146, column 1, line 52 -/--	4,5,16, 17,19, 25, 36-38,94

☒ Further documents are listed in the continuation of box C.

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>page 146, column 2, line 31 - line 42 -----</p> <p>TSVETOVATYY M ET AL: "MAGMA: an agent-based virtual market for electronic commerce" APPLIED ARTIFICIAL INTELLIGENCE, WASHINGTON, DC, US, vol. 6, no. 11, 22 April 1996 (1996-04-22), pages 501-523, XP002079276 ISSN: 0883-9514 figures 1,2 page 506, line 24 - line 30 page 507, line 1 - line 5 -----</p>	5,16,17, 19,25, 36,38
Y	<p>WO 99 11033 A (AVICI SYSTEMS) 4 March 1999 (1999-03-04) figure 1 page 1, line 11 - line 24 -----</p>	4,37,94
A	<p>SAFAEI F ET AL: "DISCORDANT VIRTUAL PATHS AND FLAT NETWORK ARCHITECTURES" ICC '98. 1998 IEEE INTERNATIONAL CONFERENCE ON COMMUNICATIONS. CONFERENCE RECORD. NEW CENTURY COMMUNICATIONS. ATLANTA, GA, JUNE 7 - 11, 1998, IEEE INTERNATIONAL CONFERENCE ON COMMUNICATIONS, NEW YORK, NY: IEEE, US, vol. 3 CONF. 5, 7 June 1998 (1998-06-07), pages 1754-1758, XP000888307 ISBN: 0-7803-4789-7 page 1754, column 2, line 1 - line 2 figure 1 page 1755, column 1, line 11 - line 20 -----</p>	4,37



# INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9911033 A	04-03-1999	AU 8904898 A	16-03-1999
		EP 1005745 A1	07-06-2000
		WO 9911033 A1	04-03-1999
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